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(54) Pipe fittings

(57) A pipe fitting includes a body member (10) defining a socket portion (11) having a bore (13) into which pipe (14) may be inserted from one end. A screwthread formation (12) is provided at one end of the socket formation (11) and is engaged by a corresponding thread (21) of a thrust nut (20). A pair of frustoconical rings (30, 31) are interposed between a radial face (26) at the end of the socket portion (11) and an opposed radial face of the thrust nut (20), the inner peripheries (35, 36) of the first and second rings (30, 31) making circumferential engagement with one another and defining cutting edges which will penetrate the wall of the pipe (14) as the thrust nut (20) is tightened on the socket formation (11) of the body member (10).

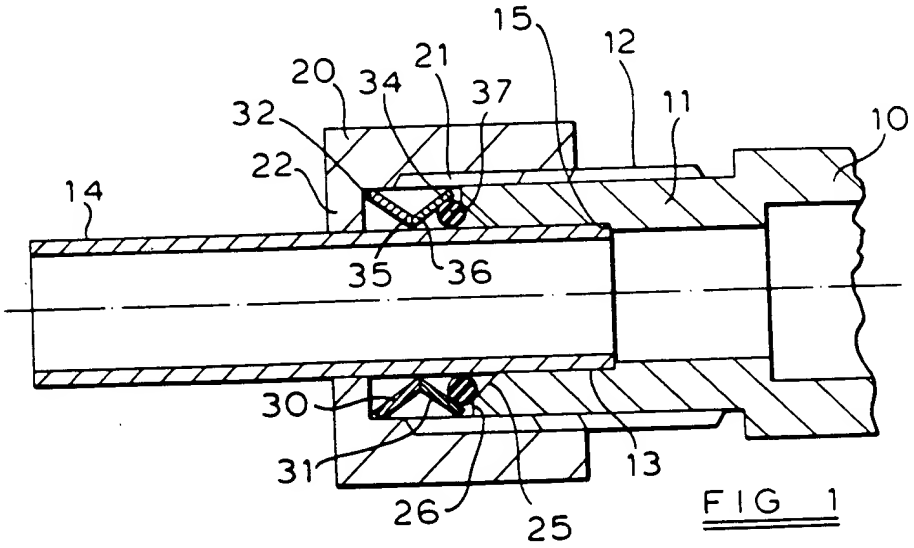

FIG 1

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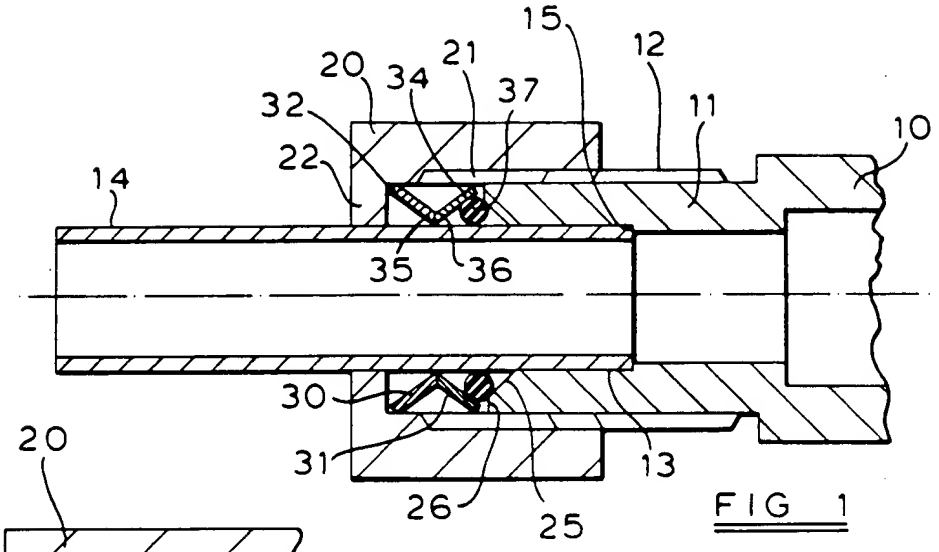


FIG 1

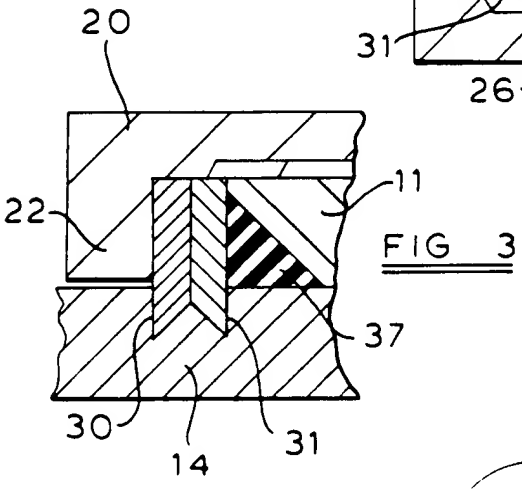
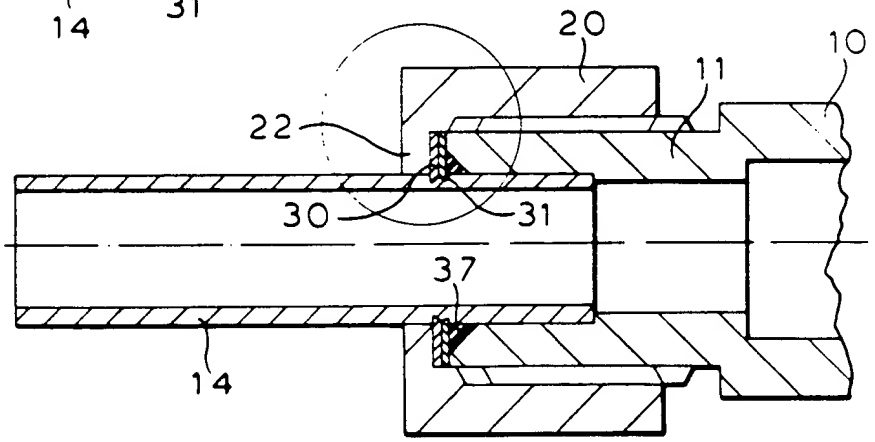


FIG 3

FIG 2



PIPE FITTINGS

The present invention relates to pipe fittings and in particular to compression fittings for pipes made of relatively soft materials.

In conventional compression fittings for pipes, a ring is located on the pipe and is compressed into tight engagement with the pipe between opposed conical faces on screw threaded fastening means. With pipes made of soft materials such as lead or plastics, compression of the ring will merely deform a pipe and the joint will be of low tensile strength. The strength of the joint may be improved by using a strengthening liner which is inserted into the end of the pipe to which the fitting is attached. However the soft material is able to extrude between the compressed ring and liner, when subjected to tensile loads.

In accordance with GB 2,186,934A, it has been proposed to provide an end fitting including a gripper ring which, upon tightening of the screw threaded fastening means will cut into the pipe. This will provide a joint with improved tensile strength.

In order that the pipe is not unduly weakened where it is cut into by the gripper ring, penetration of the gripper

ring must be limited. Furthermore, the gripper ring must be relatively thin, so that it can be deformed to cut into the pipe, without the need for excessive torsional loads on the screw fastening means. As a result, improvement in the tensile strength of the joint achieved in this manner is limited.

The present invention provides a pipe fitting for pipes made of soft materials which will produce a joint of improved tensile strength.

According to one aspect of the present invention a pipe fitting comprises a body member, said body member defining a socket portion having a bore into which a pipe may be inserted from one end, a screw thread formation being provided at said one end of the socket formation, said screw thread formation being engaged by a corresponding thread of a thrust nut, a first and second frustoconical ring being interposed between a radial face at said one end of the socket portion and an opposed radial face of the thrust nut, the outer periphery of the first ring engaging the radial face of the thrust nut and the outer periphery of the second ring engaging the radial face of the socket portion, the inner peripheries of the first and second rings making circumferential engagement with one another, said inner peripheries defining cutting edges.

With the pipe fitting described above, when a tube is located in the bore of the socket portion and the thrust nut is tightened up to flatten the first and second frustoconical rings, the inner peripheries of the frustoconical rings will cut into the wall of the pipe. As both conical rings cut into the wall of the pipe, the tensile strength of the joint will be increased without increasing the torsional load required to deform the rings.

Preferably the frustoconical rings are dimensional such that when flattened they will cut into the pipe to give a penetration of from 10% to 25% of the wall thickness of the pipe. The outer diameter of the first frustoconical ring is a good tolerance fit within a cylindrical surface of the thrust nut while the outer diameter of the second frustoconical ring is from 5% to 10% smaller than the internal diameter of the thread, in order to avoid the ring fouling the thread as it is flattened.

The second frustoconical ring may serve to locate an elastomeric sealing ring within a suitable formation in the socket portion, so that upon tightening of the thrust nut the sealing ring will be compressed between the socket portion and tube to provide a seal therebetween.

Preferably, the socket formation has an abutment at the end

opposite to said first end for engagement of the end of the pipe, to provide axial location of the pipe with respect to the fitting.

An embodiment of the invention is now described, by way of example only, with reference to the accompanying drawings in which:-

Figure 1 illustrates in cross-section a pipe fitting in accordance with the present invention;

Figure 2 illustrates in cross-section the pipe fitting shown in Figure 1 connected to a pipe; and

Figure 3 is an enlarged view of the ringed portion of Figure 2.

The pipe fitting illustrated comprises a body member 10 which defines a socket portion 11 with external screw thread 12. Socket portion 11 has a bore 13, the diameter of which is equal to the nominal diameter of the pipe 14 for which the fitting is to be used, so that the pipe 14 may be inserted therein. The bore 13 is stepped to provide a shoulder 15 against which the end of pipe 14 will abut to locate the fitting axially of the pipe 14.

A thrust nut 20 with internal screw thread 21 engages the thread 12. The thrust nut 20 has an inwardly directed flange formation 22.

The end of the socket formation 11 is provided with a conical recess 25 on its inner diameter and defines a flat radial face 26 adjacent its outer periphery. A pair of conical copper rings 30, 31 of flat section are located within the thrust nut 20 between the end of the socket portion 11 and flange 22. The outer periphery 32 of ring 30 engages flange 22 at its outer periphery and the outer periphery 34 of ring 31 engages the radial face 26 of socket portion 11. The inner peripheries 35 and 36 of rings 30 and 31 which are machined to provide a sharp cutting edge, engage one another circumferentially. An elastomeric O-ring 37 is located between the conical recess 25 and conical ring 31.

The pipe fitting is pre-assembled with the thrust nut 20 hand tightened on to socket formation 11, so that the rings 30 and 31 and O-ring 37 are located axially and radially therebetween. The internal diameters of the rings 30 and 31 are equal to the nominal diameter of the pipe 14, so that the pipe 14 may be pushed into the bore 13. The thrust nut 20 is then tightened up so that the rings 30 and 31 are flattened and cut into the pipe 14, as illustrated in

Figures 2 and 3. The ring 31 also compresses the O-ring 37 into the conical recess 25 to provide a seal.

Pipe fittings of the type disclosed above may be used to couple two or more lengths of pipe together or to connect pipes to components such as valves, sensors, etc. When used to couple two or more pipes made of soft material, the body member will define an appropriate number of socket portions and each fitting may be as described above. To connect a pipe made of soft material to one made of hard material, for example a lead pipe to a copper pipe, the coupling may comprise a fitting as described above for the lead pipe and a conventional compression fitting for the copper pipe.

The pipe fitting described above may be used with a pipe liner to strengthen the end of the pipe to which the fitting is attached, particularly on thin walled pipes.

Although in the pipe fitting described with reference to the accompanying drawings the socket portion is threaded externally and the thrust nut internally, the socket portion may alternatively be provided with an external thread and the thrust nut with a corresponding external thread.

While the pipe fitting disclosed above is particularly suitable for pipes made of soft materials such as lead or

plastics, it may be used with harder materials where, for example, a joint of high tensile strength is required for high pressure applications. In order to ensure that the frustoconical rings will cut into the pipe when the fitting is tightened, the frustoconical rings or at least the inner peripheries thereof should be harder than the pipe.

CLAIMS

1. A pipe fitting comprising a body member, said body member defining a socket portion having a bore into which a pipe may be inserted from one end, a screw thread formation being provided at said one end of the socket formation, said screw thread formation being engaged by a corresponding thread of a thrust nut, a first and second frustoconical ring being interposed between a radial face at said one end of the socket portion and an opposed radial face of the thrust nut, the outer periphery of the first ring engaging the radial face of the thrust nut and the outer periphery of the second ring engaging the radial face of the socket portion, the inner peripheries of the first and second rings making circumferential engagement with one another, said inner peripheries defining cutting edges.

2. A pipe fitting according to claim 1 in which the first and second frustoconical rings are dimensioned such that when flattened, they will cut into the pipe to give a penetration of from 10% to 25% of the wall thickness of the pipe.

3. A pipe fitting according to claim 1 or 2 in which the outer diameter of the first frustoconical ring is a good tolerance fit within a cylindrical surface of the thrust nut.

4. A pipe fitting according to any one of claims 1 to 3 in which the outer diameter of the second frustoconical ring is from 5% to 10% smaller than the internal diameter of the thread on the socket portion.

5. A pipe fitting according to any one of the preceding claims in which a sealing ring is located between said second frustoconical ring and the end of the socket portion.

6. A pipe fitting according to claim 5 in which a recess if provided on the internal diameter of the end of the socket portion, for location of the sealing ring.

7. A pipe fitting according to any one of the preceding claims in which the socket formation defines an abutment for engagement of the end of the pipe.

8. A pipe fitting according to any one of the preceding claims in which a pipe liner is located in the end of the pipe to which the fitting is attached.

9. A pipe fitting substantially as described herein with reference to and as shown in Figures 1 to 3 of the accompanying drawings.

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